

Scientific Inquiry

8-1 The student will demonstrate an understanding of technological design and scientific inquiry, including process skills, mathematical thinking, controlled investigative design and analysis, and problem solving.

8-1.6 Use appropriate tools and instruments (including convex lenses, plane mirrors, color filters, prisms, and slinky springs) safely and accurately when conducting a controlled scientific investigation.

Taxonomy Level: 3.2-B Apply Conceptual Knowledge

Previous/Future knowledge: In previous grades, students used magnifiers and eyedroppers (K-1.2), rulers (1-1.2), thermometers, rain gauges, balances, and measuring cups (2-1.2), beakers, meter tapes and sticks, forceps/tweezers, tuning forks, graduated cylinders, and graduated syringes (3-1.5), a compass, an anemometer, mirrors, and a prism (4-1.2), a timing device and a 10x magnifier (5-1.4), a spring scale, beam balance, barometer, and sling psychrometer (6-1.1), and a microscope (7-1.1) safely, accurately, and appropriately. In future grades, students will use these tools when appropriate as well as learn new tools to use when collecting scientific data. A complete list of tools can be found in Appendix A of the Academic Standards.

It is essential for students to know that different tools are needed to collect different kinds of data.

- *Convex lenses* are tools used to bend, or refract, light causing objects to be magnified.
- A *plane mirror* is a tool used to reflect light.
- A *color filter* is a tool that blocks certain wavelengths of light and transmits others.
- A *prism* is a tool that breaks light into the colors of the spectrum.
 - To use a prism appropriately, the light has to enter the prism at the correct angle to the surface in order to separate the white light.
- A *slinky spring* is a tool used to model waves.

It is essential for students to use care when handling these tools when gathering data.

- Care should be taken not to break or scratch the mirrors, lenses, or prisms.
- Color filters should not be scraped across each other as they will scratch.
- Slinky springs should not be over-stretched or twisted.

It is also essential for students to use tools from previous grade levels that are appropriate to the content of this grade level such as eyedroppers, magnifiers, rulers (measuring to millimeters), thermometers (measuring in °F and °C), beakers (measuring to milliliters), forceps/tweezers, graduated cylinders (measuring in milliliters), meter sticks and meter tapes (measuring in meters, centimeters, or millimeters), compasses, plane mirrors, prisms, timing devices (measuring in minutes or seconds), or triple beam balances (measuring to grams), tuning forks, and spring scales (measuring in newtons or grams) to gather data.

NOTE TO TEACHER: See information in previous grades regarding how to use each tool. All temperature readings during investigations will be taken using the Celsius scale unless the data refers to weather when the Fahrenheit scale is used.

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8-1 The student will demonstrate an understanding of technological design and scientific inquiry, including process skills, mathematical thinking, controlled investigative design and analysis, and problem solving.

It is not essential for students to use telescopes, concave or convex mirrors or concave lenses. Tools from previous grades that are not appropriate to the content of this grade level are not essential; however, these terms may be used as distracters (incorrect answer options) for assessment, for example rain gauges, measuring cups, graduated syringes, anemometers, 10X magnifiers, barometers, sling psychrometers, and microscopes. Students do not need to convert measurements from English to metric or metric to English.

Assessment Guidelines

The objective of this indicator is to *use* tools safely, accurately, and appropriately when gathering data; therefore, the primary focus of assessment should be to apply correct procedures to the use of convex lenses, plane mirrors, color filters, prisms, and slinky springs, and other tools essential to the grade level that would be needed to conduct a science investigation. However, appropriate assessments should also require students to *identify* appropriate uses for convex lenses, plane mirrors, color filters, prisms, and slinky springs; *illustrate* the appropriate tool for an investigation using pictures, diagrams, or words; *recall* how to accurately determine the measurement from the tool; or *recognize* ways to use science tools safely, accurately, and appropriately.